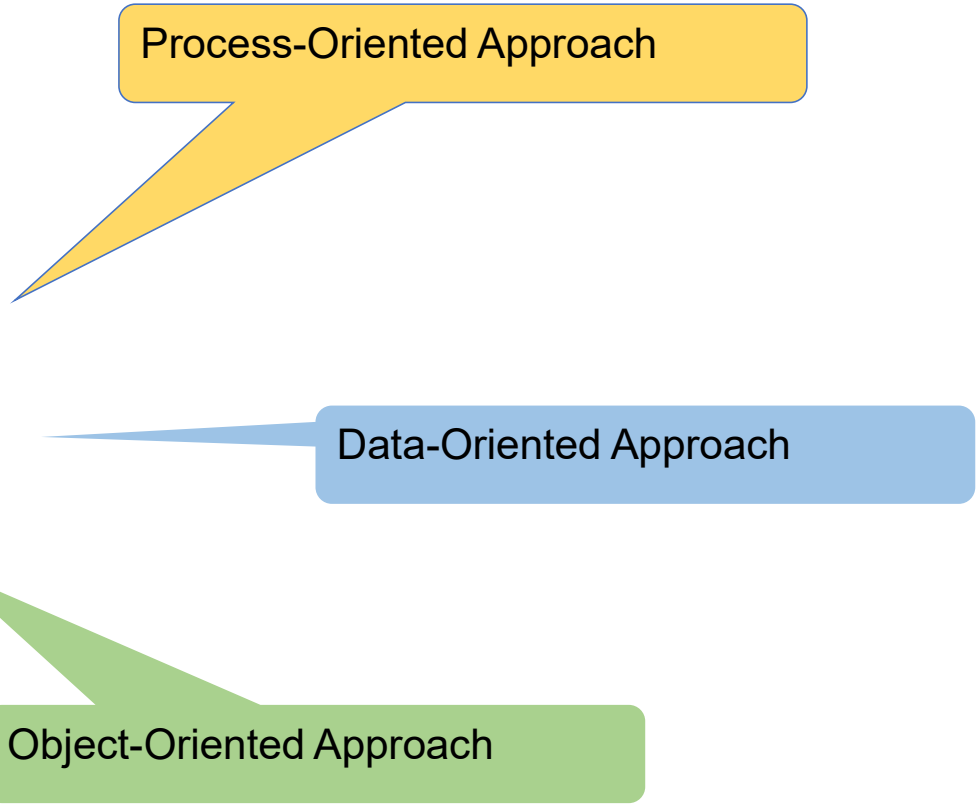
Sabancı Üniversitesi SABANCI BUSINESS SCHOOL

Chapter 1

The Database Environment

System Modeling

- **Process Modeling**
- **Data Modeling**
- **Object Modeling**

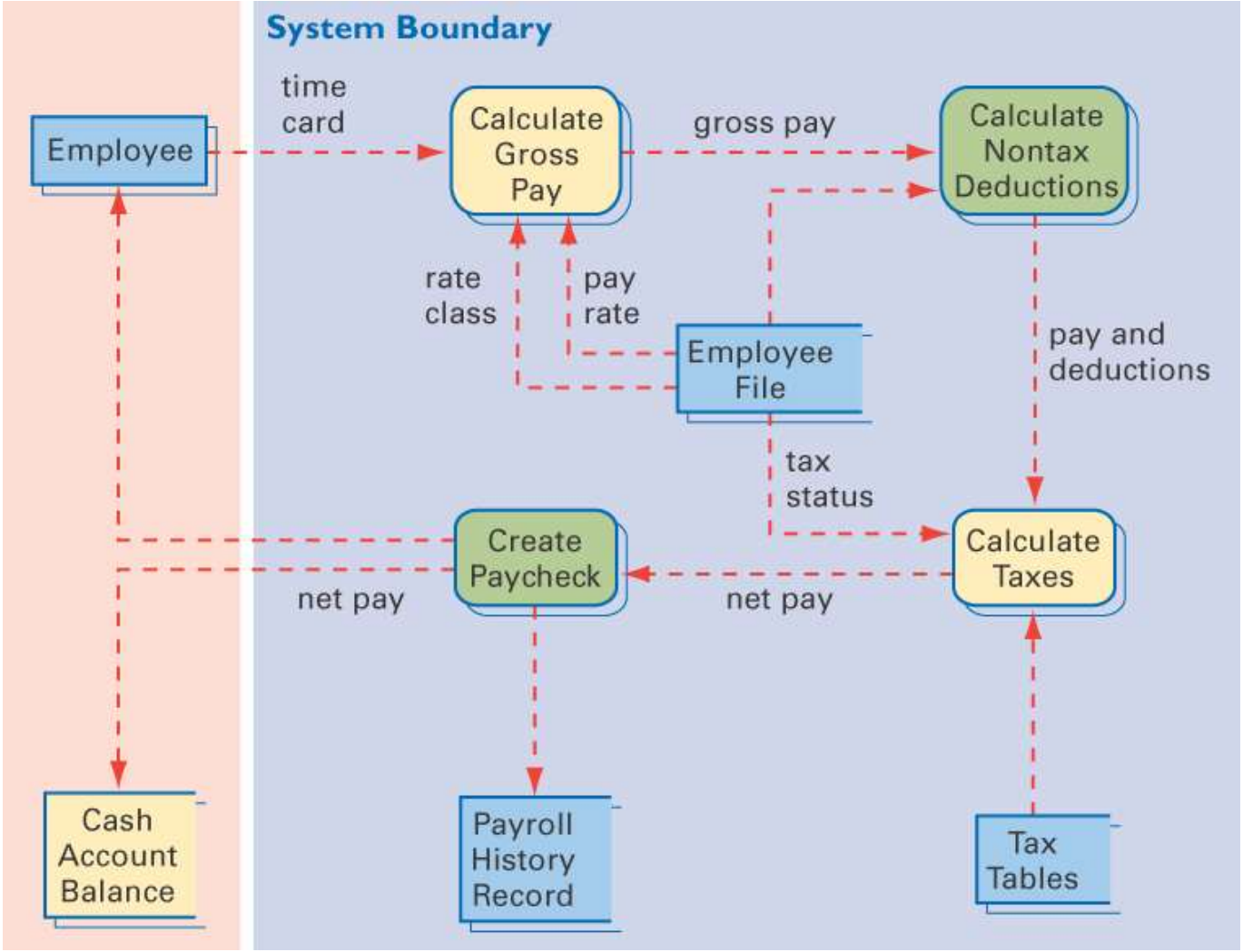


Approaches to Systems Development

- Process-Oriented Approach

  - Focus is on flow, use and transformation of data in an information system
  - Involves creating graphical representations such as data flow diagrams and charts
  - Data are tracked from sources, through intermediate steps and to final destinations
  - Natural structure of data is not specified
  - Helps us understand and improve how the organization functions
  - Disadvantage: data files are tied to specific applications

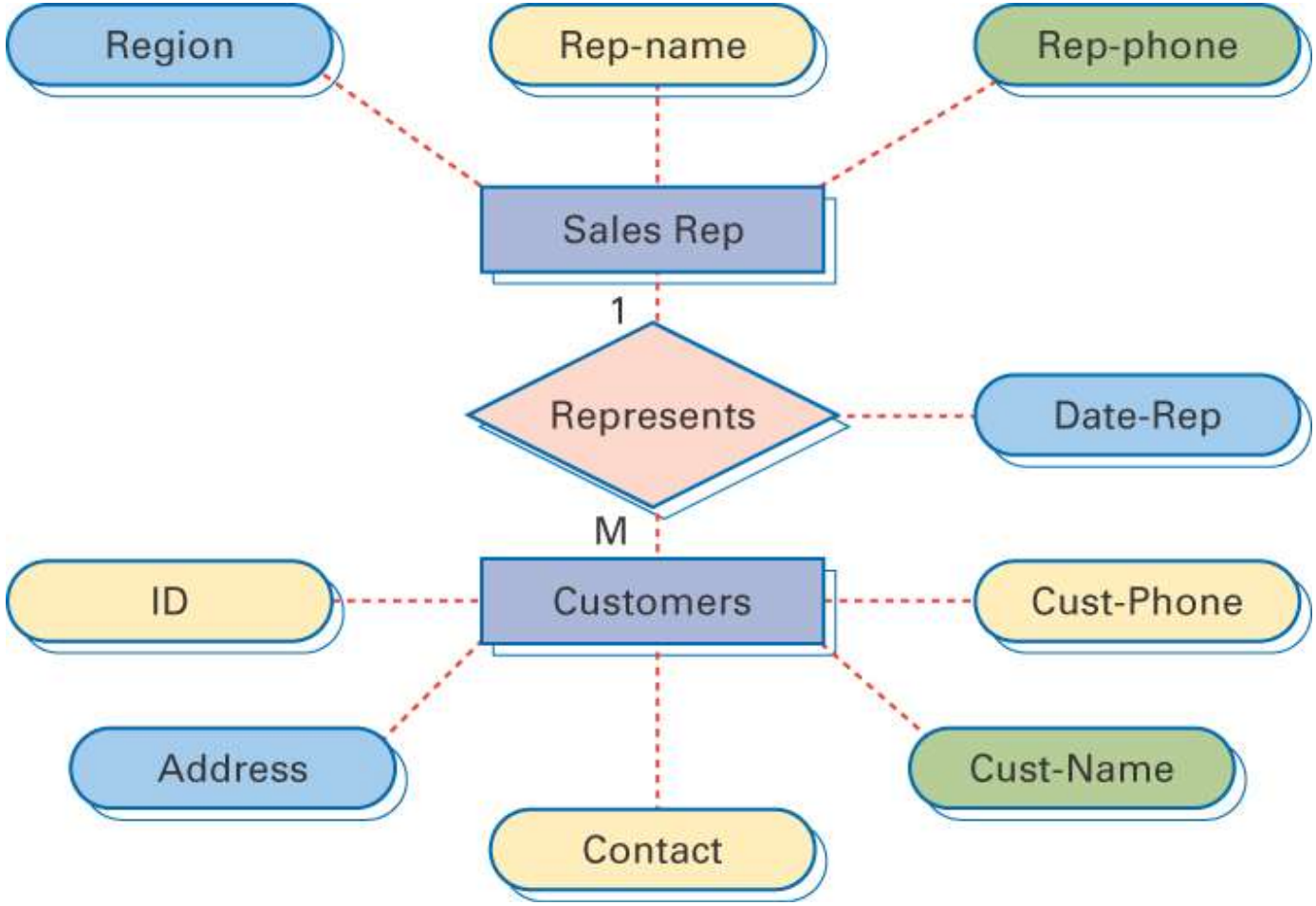
Data Flow Diagram Example



Approaches to Systems Development

- Data-Oriented Approach
  - Depicts ideal organization of data, independent of where and how data are used
  - Data model describes kinds of data and business relationships among the data
  - Business rules depict how organization captures and processes the data
  - Helps us understand, preserve and protect the organization's data resources

Entity-Relationship model



Approaches to Systems Development

- Object-Oriented Approach
  - Describe the properties of objects, their relationship to one another, and the functions they perform
  - Examples
    - Inheritance diagrams
    - State diagrams

What is a Database Management System?

- Database
  - An organized collection of logically related data, designed to meet the information needs of multiple users in an organization
- Database Management System
  - Comprises programs to store, retrieve, and otherwise manage a computerized database and to provide interfaces to application programs and to non-programming users

Data in Context

Class Roster

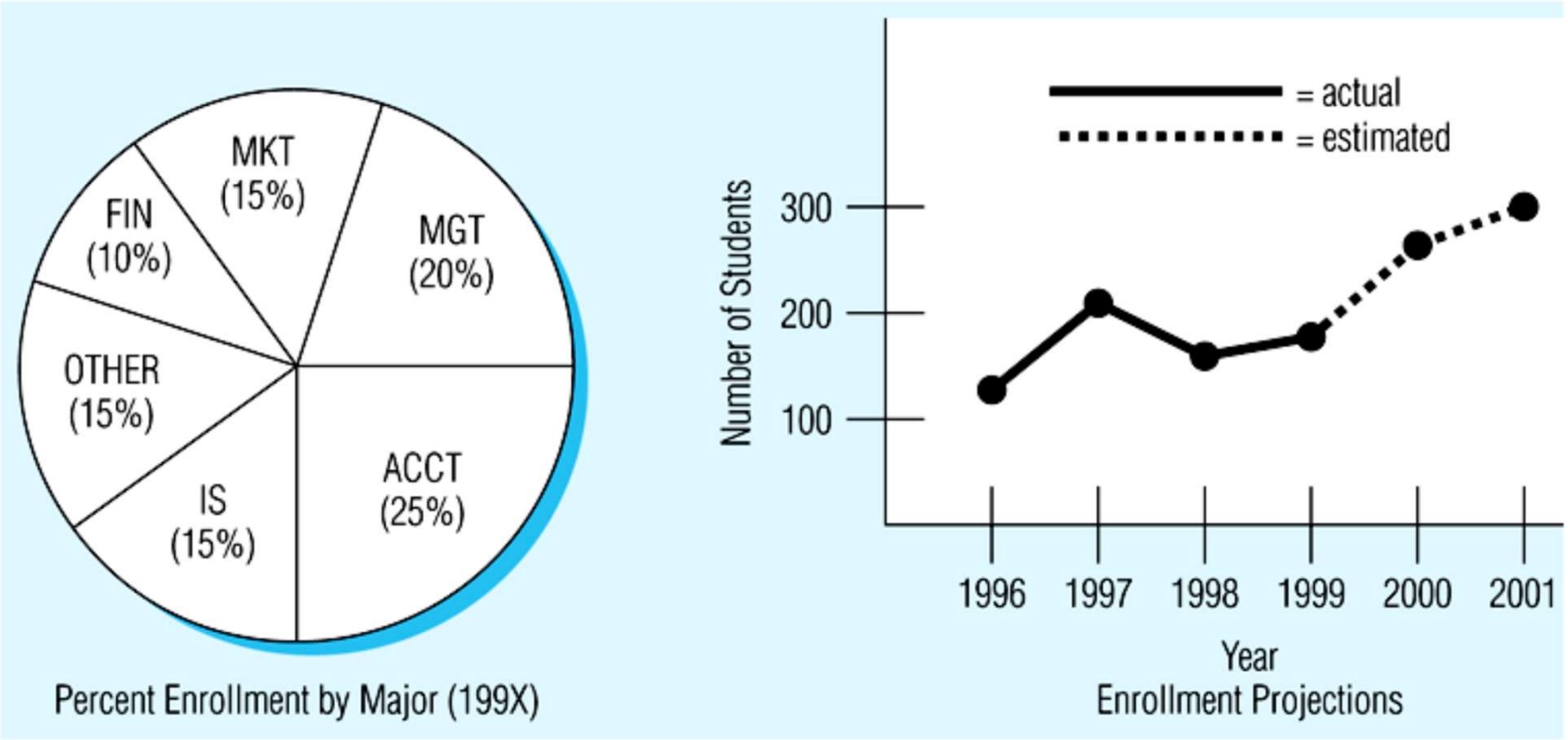
Course: MGT 500 Business Policy

Semester: Spring 200X

Section: 2

Name	ID	Major	GPA
Baker, Kenneth D.	324917628	MGT	2.9
Doyle, Joan E.	476193248	MKT	3.4
Finkle, Clive R.	548429344	PRM	2.8
Lewis, John C.	551742186	MGT	3.7
McFerran, Debra R.	409723145	IS	2.9
Sisneros, Michael	392416582	ACCT	3.3

Summarized data



Meta Data

"Data about data"

Descriptions of the properties or characteristics of the data, including data types, field sizes, allowable values, and documentation

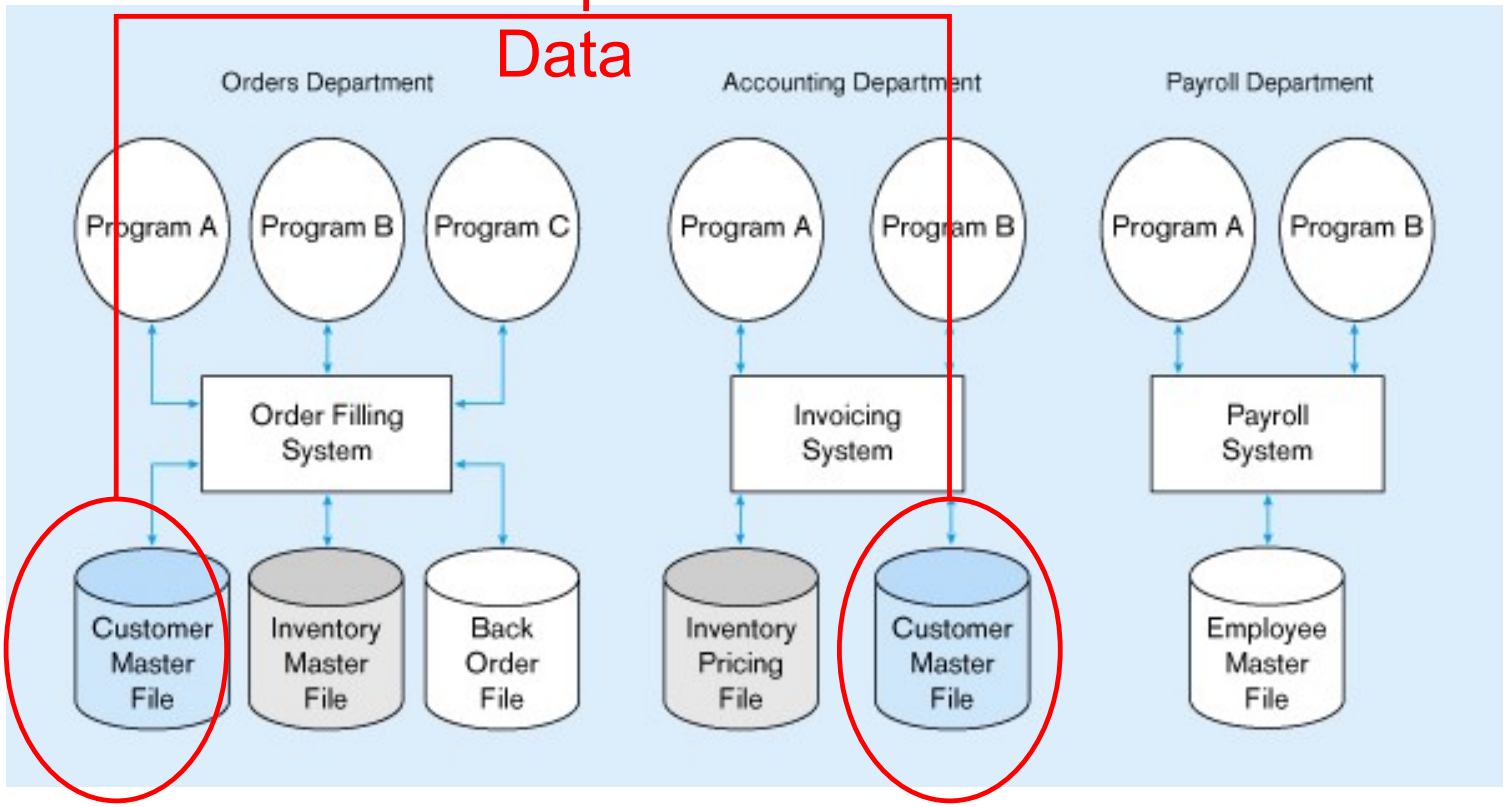
Data Item		*Value*			
Name	**Type**	**Length**	**Min**	**Max**	**Description**
Course	Alphanumeric	30			Course ID and name
Section	Integer	1	1	9	Section number
Semester	Alphanumeric	10			Semester and year
Name	Alphanumeric	30			Student name
ID	Integer	9			Student ID (SSN)
Major	Alphanumeric	4			Student major
GPA	Decimal	3	0.0	4.0	Student grade point average

Pine Valley Furniture (File Processing System)

- 15 Years ago, Mr. Knotts started making furniture as a hobby
- Now has 100 employees with several product lines
- Experiencing rapid growth
- Separate departments: Sales & Orders, Accounting & Purchasing, and Payroll
- 3 Computer Applications meeting the needs of a particular dept or group

What problems do you think the company is facing?

Three file processing systems at Pine Valley Furniture



Focuses on the data processing needs of individual departments in an organization

Disadvantages of File Processing Systems

- Data Redundancy (Duplication of data)
  - Different systems/programs have separate copies of the same data
- Program-data Dependence
  - All programs maintain metadata for each file they use
- Limited Data Sharing
  - No centralized control of data
- Lengthy Development Times-poor enforcement standards
  - Programmers must design their own file formats
- Excessive Program Maintenance.
  - 80% of of information systems budget

Problems with Data Dependency

- Each application programmer must maintain their own data
- Each application program needs to include code for the metadata of each file
- Each application program must have its own processing routines for reading, inserting, updating and deleting data
- Lack of coordination and central control
- Non-standard file formats

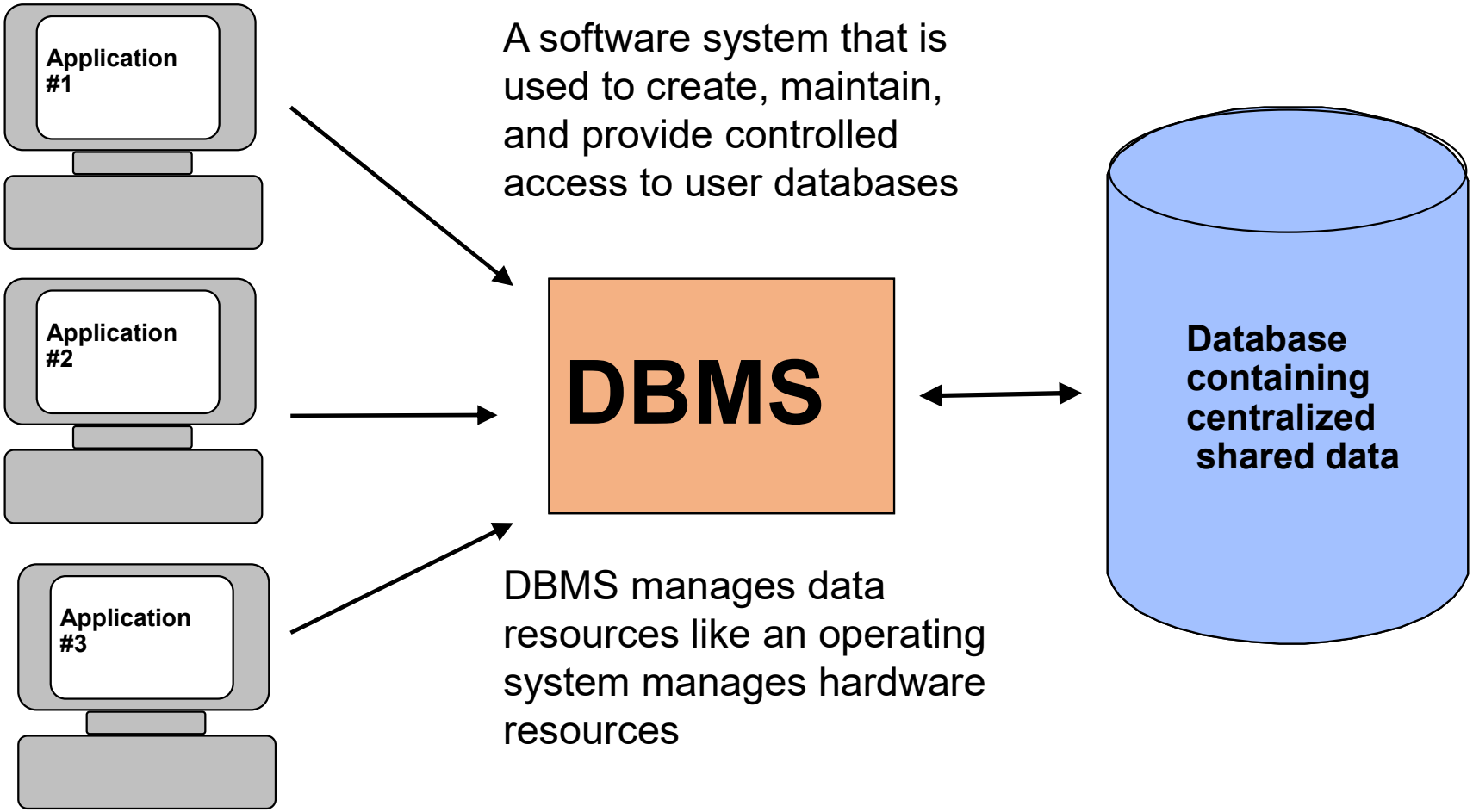
Problems with Data Redundancy

- Waste of space to have duplicate data
- Causes more maintenance headaches
- The biggest Problem:
  - **When data changes in one file, could cause inconsistencies**
  - Compromises ***data integrity***

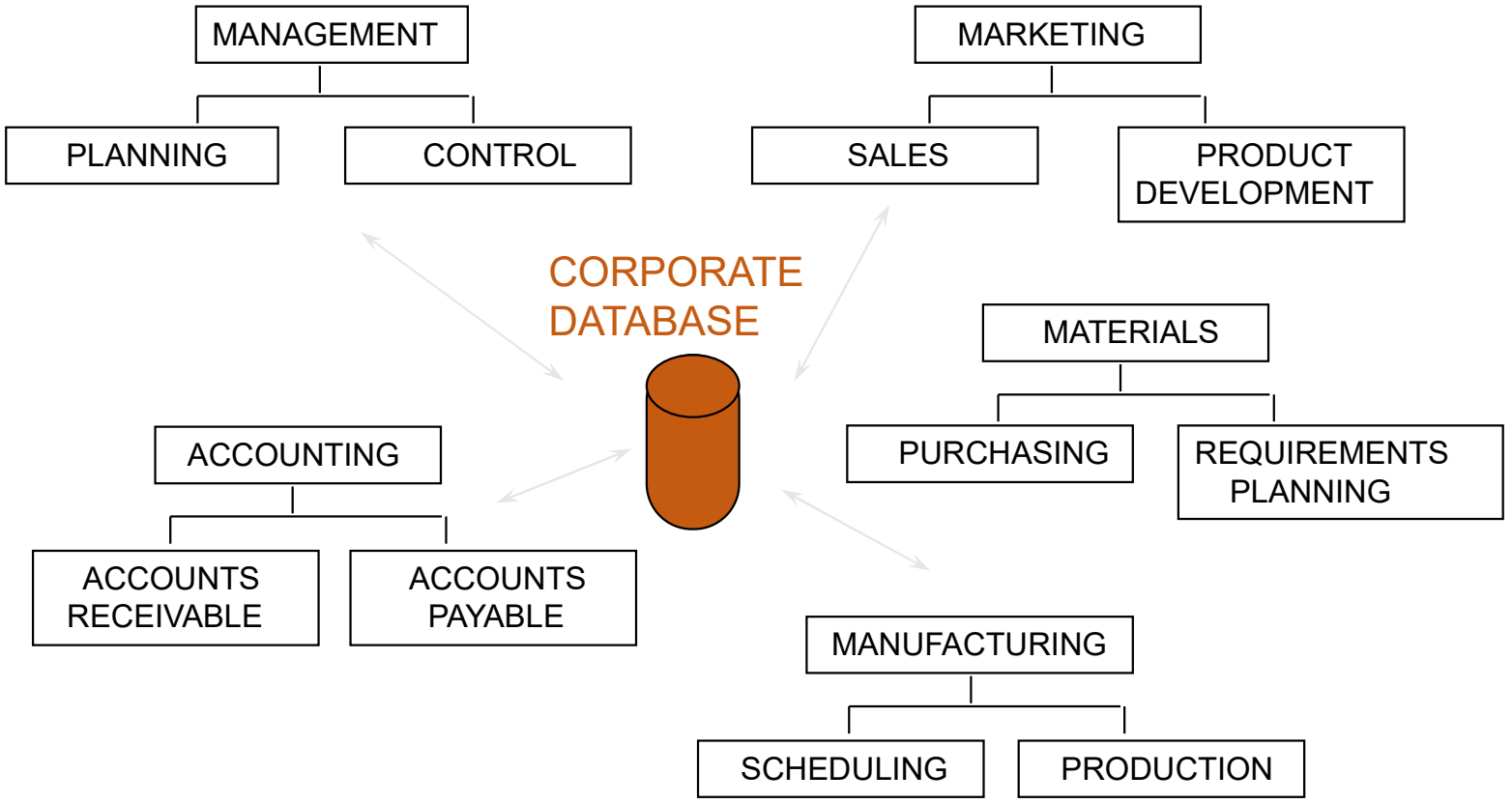
SOLUTION: The Database Approach

- Emphasizes the integration of data across the organization
- Central repository of shared data
- Data is managed by a controlling agent
- Stored in a standardized, convenient form

Database Management System



Concept of a shared Corporate Database



Advantages of Database Approach

- Program-Data Independence
  - Metadata stored in DBMS, so applications don't need to worry about data formats
  - Data queries/updates managed by DBMS so programs don't need to process data access routines
  - Results in: increased application development and maintenance productivity
- Minimal Data Redundancy
  - Leads to increased data integrity/consistency

Advantages of Database Approach

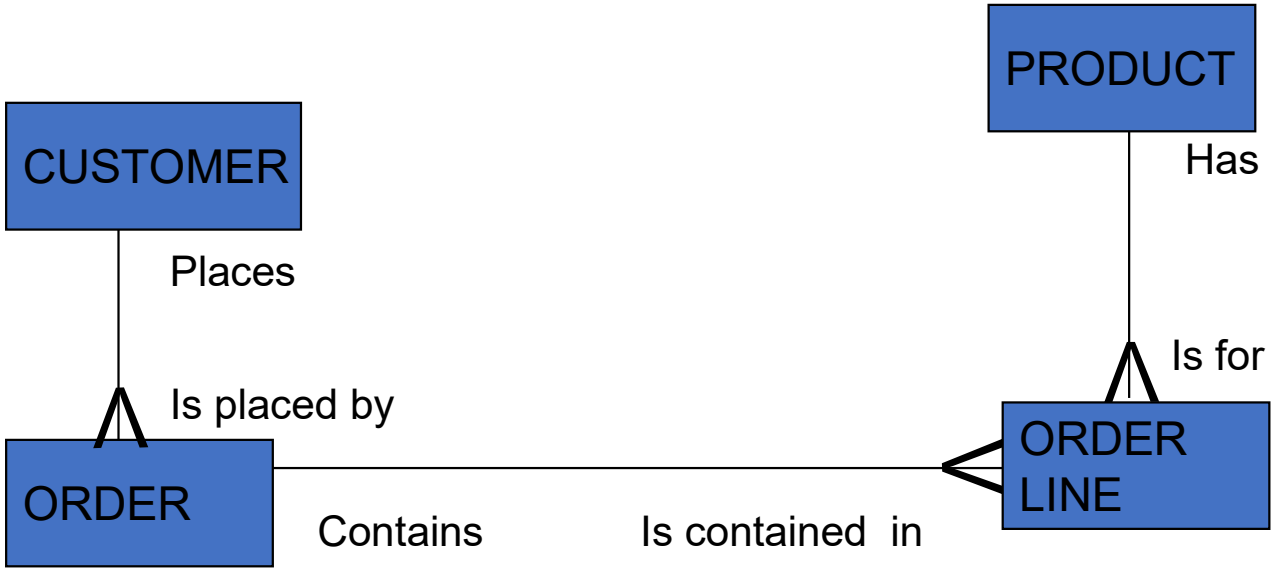
- Improved Data Sharing
  - Different users get different views of the data
- Enforcement of Standards
  - All data access is done in the same way
- Improved Data Quality
  - Constraints, data validation rules
- Better Data Accessibility/ Responsiveness
  - Use of standard data query language (SQL)
- Security, Backup/Recovery, Concurrency
  - Disaster recovery is easier

Costs and Risk of the Database Approach

- Data backup costs
  - Result of minimal data redundancy
- Interference with shared data (concurrency controls)
- Ongoing Costs
  - Requires New, Specialized Personnel
  - Need for Explicit Backup and Recovery
- Privacy, security issues
- Organizational conflict
  - Data definitions and responsibilities.
  - Old habits die hard

Enterprise Data Model

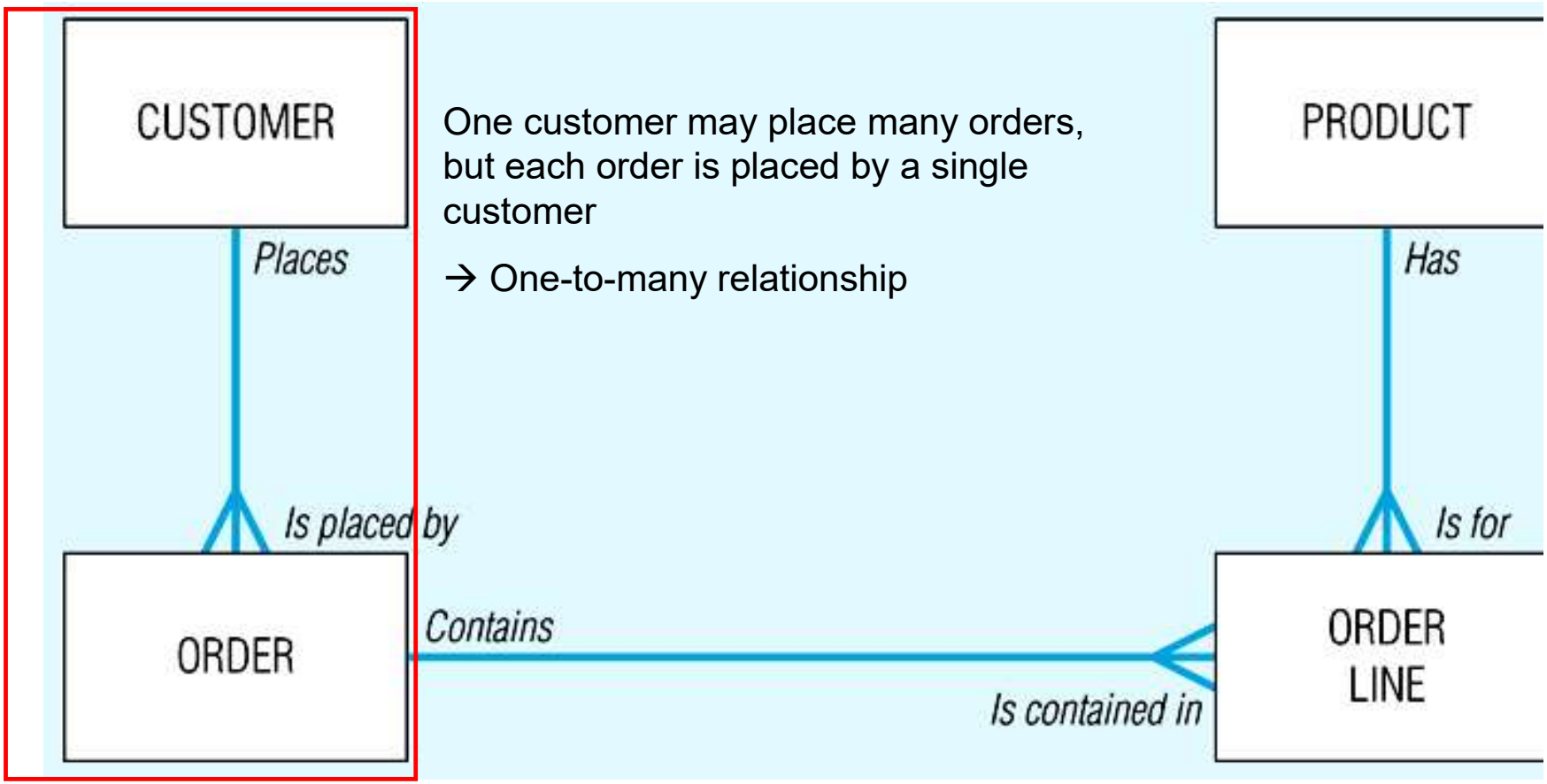
- A graphical model that shows the high-level *entities* for an organization and the *relationships* among the entities



Characteristics of Enterprise Data Model

- Provides valuable information about how the organization functions as well as important constraints
- Stresses the integration of data and processes by focusing on the entities, relationships and business rules

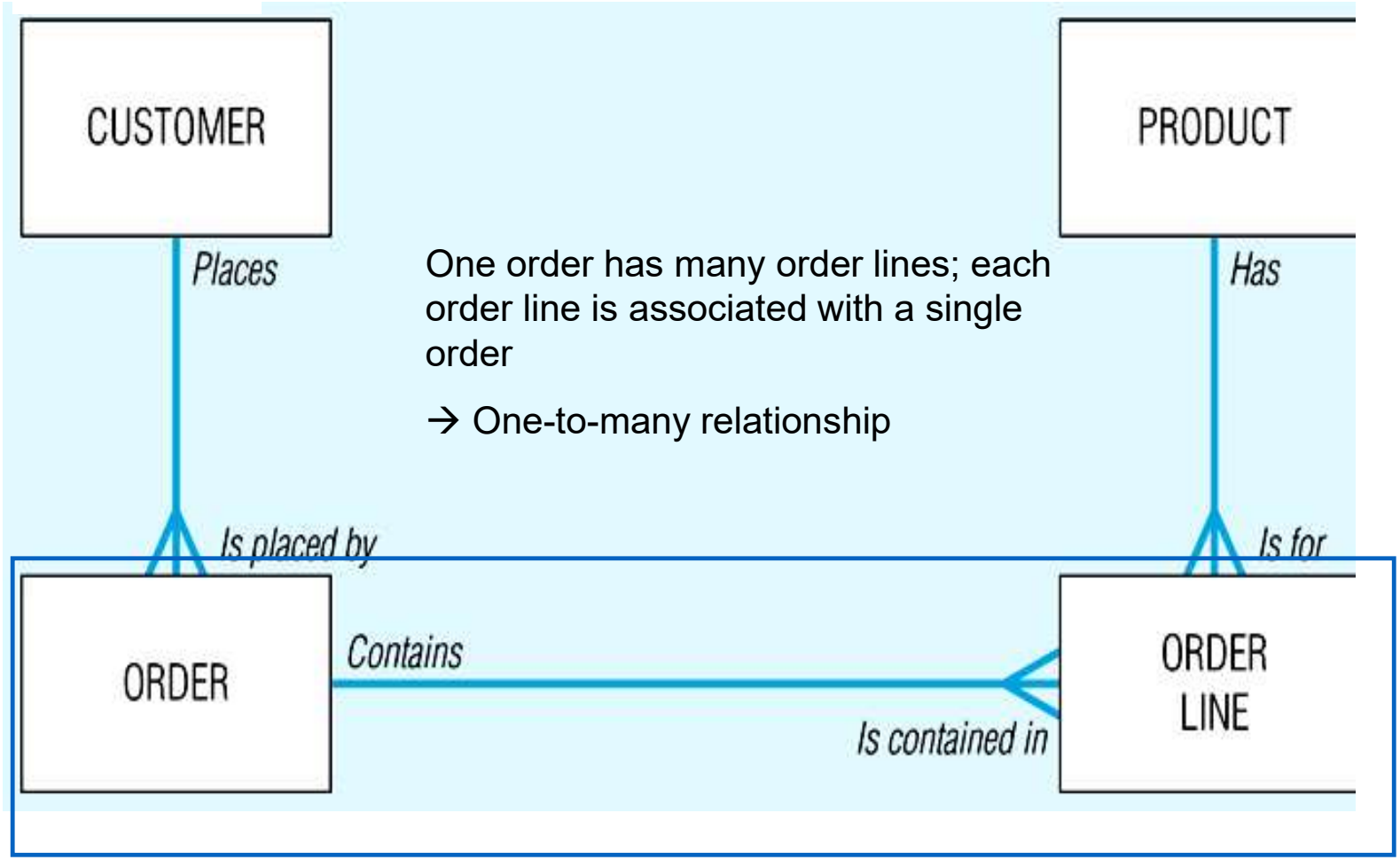
Segment from enterprise data model



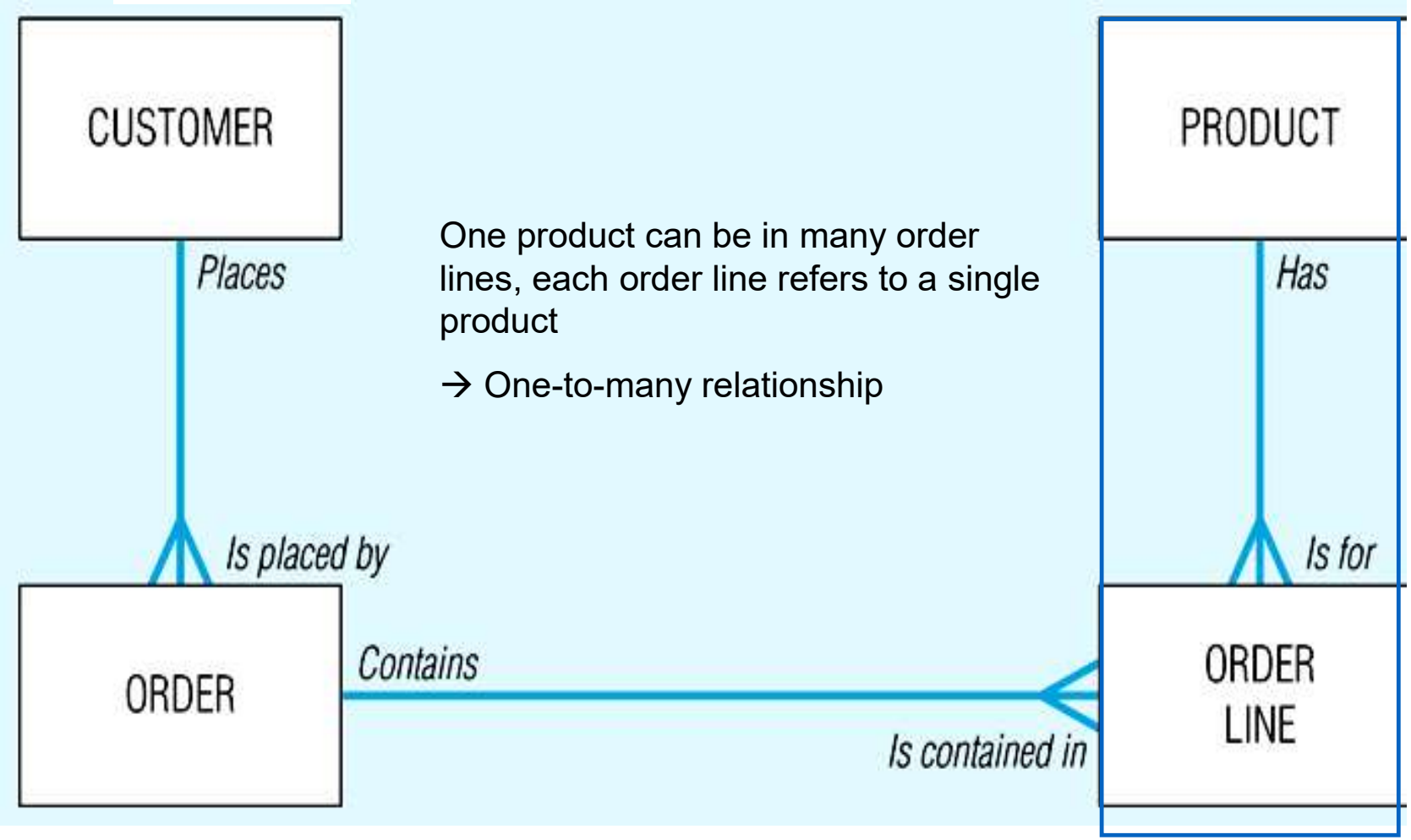
One customer may place many orders, but each order is placed by a single customer

→ One-to-many relationship

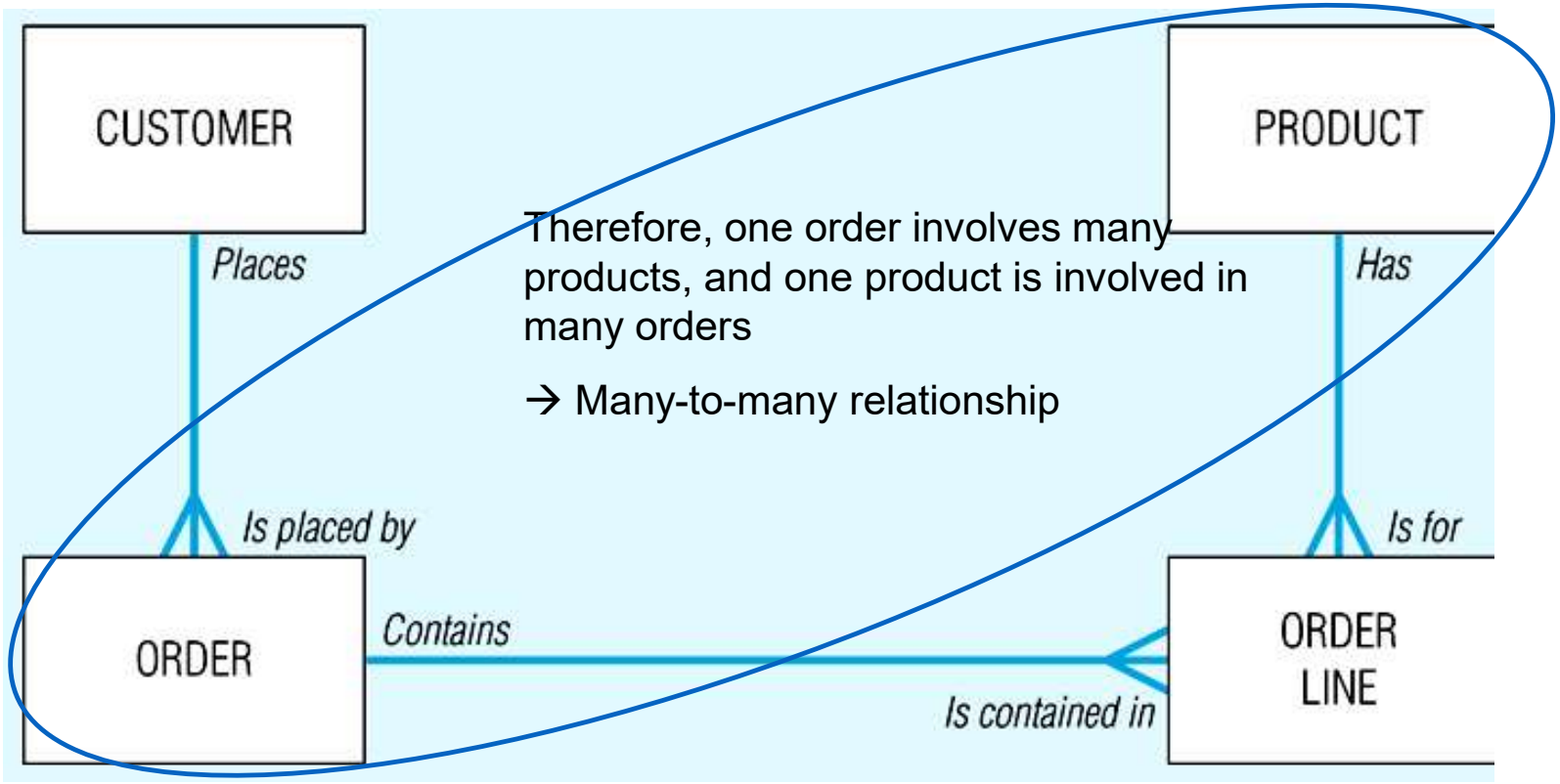
Segment from enterprise data model



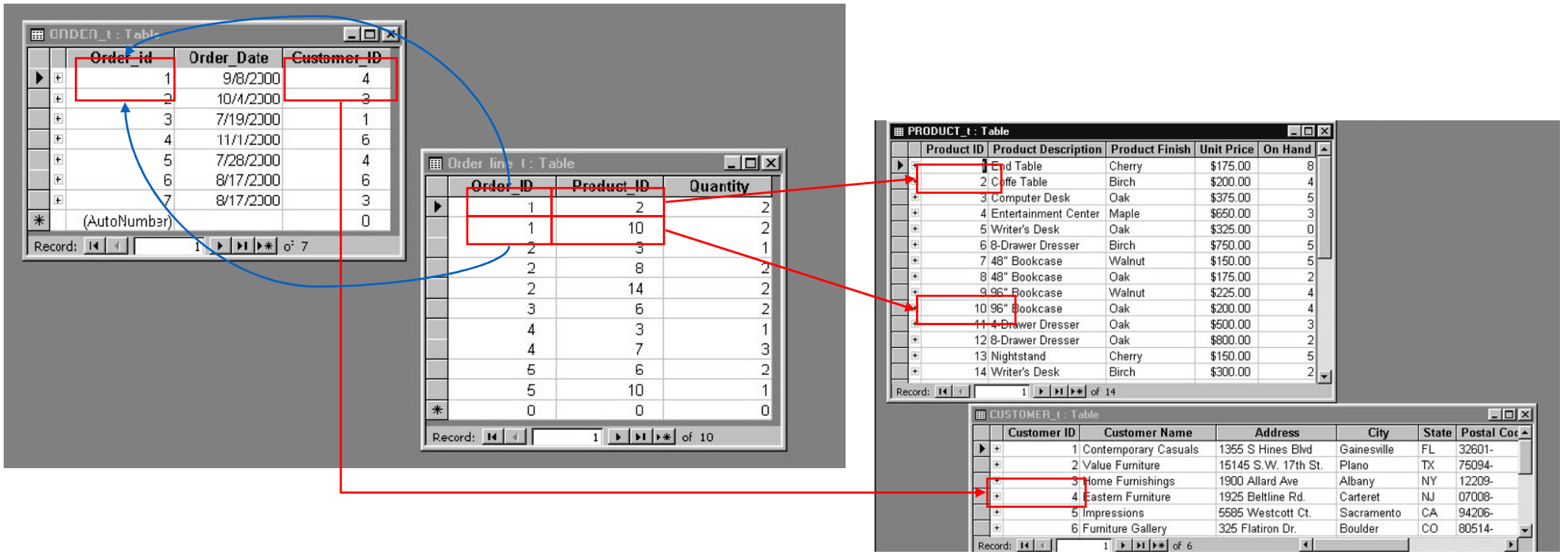
Segment from enterprise data model



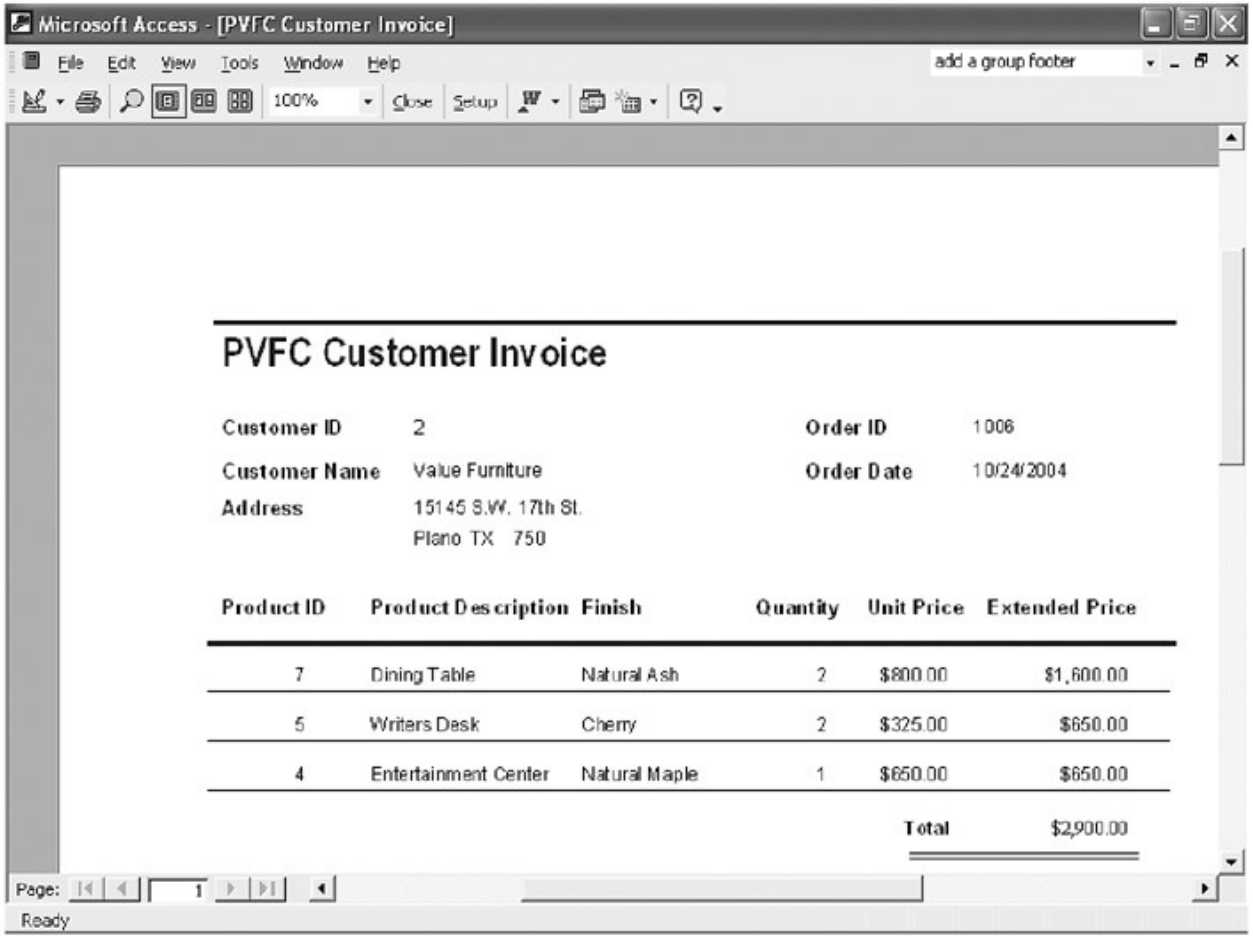
Segment from enterprise data model



Order, Order_Line, Customer, and Product tables



Relationships established in special columns that provide links between tables



Application program functions:

inserting new data, ***updating*** existing data,
deleting existing data, ***reading*** data for display

Components of the Database Environment

- **CASE Tools** – computer-aided software engineering & data modeling and design tools
- **Repository** – centralized storehouse of metadata
- **Database Management System (DBMS)** – software for managing the database
- **Database** – storehouse of the data
- **Application Programs** – software using the data
- **User Interface** – text and graphical displays to users
- **Data Administrators** – personnel responsible for maintaining the database
- **System Developers** – personnel responsible for designing databases and software
- **End Users** – people who use the applications and databases

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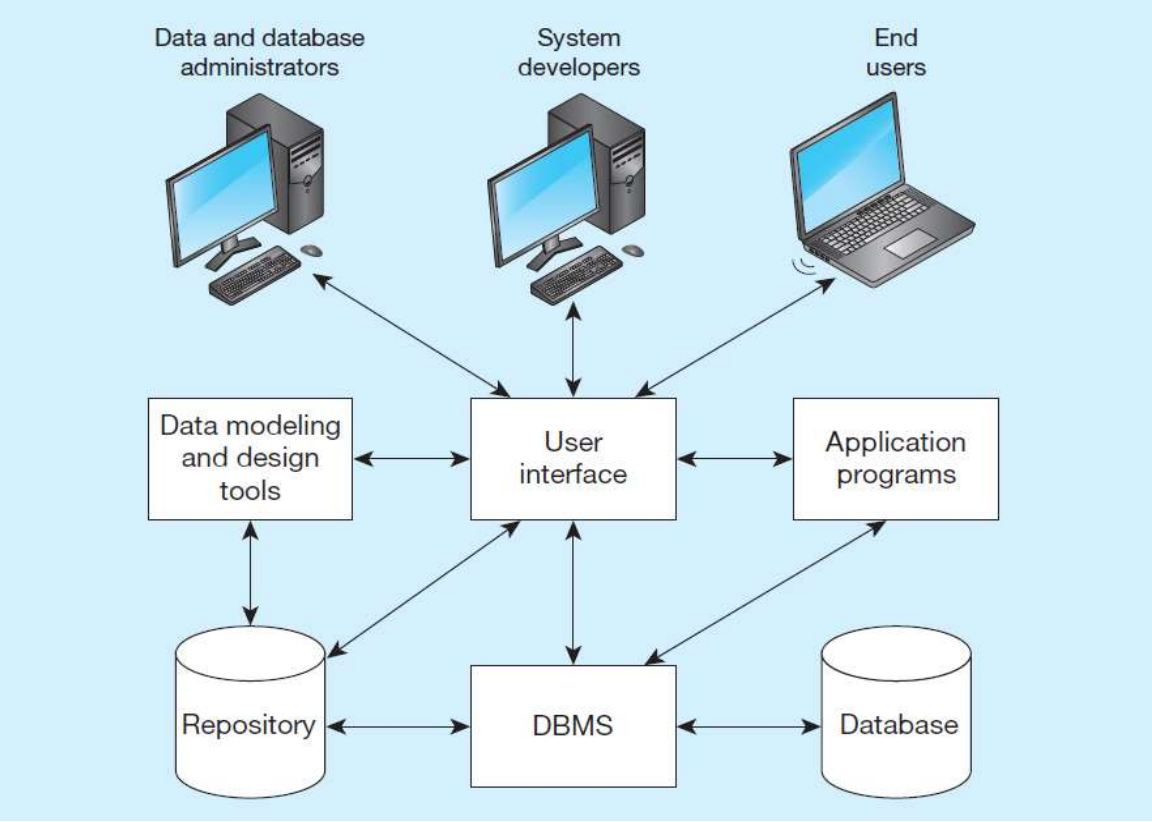
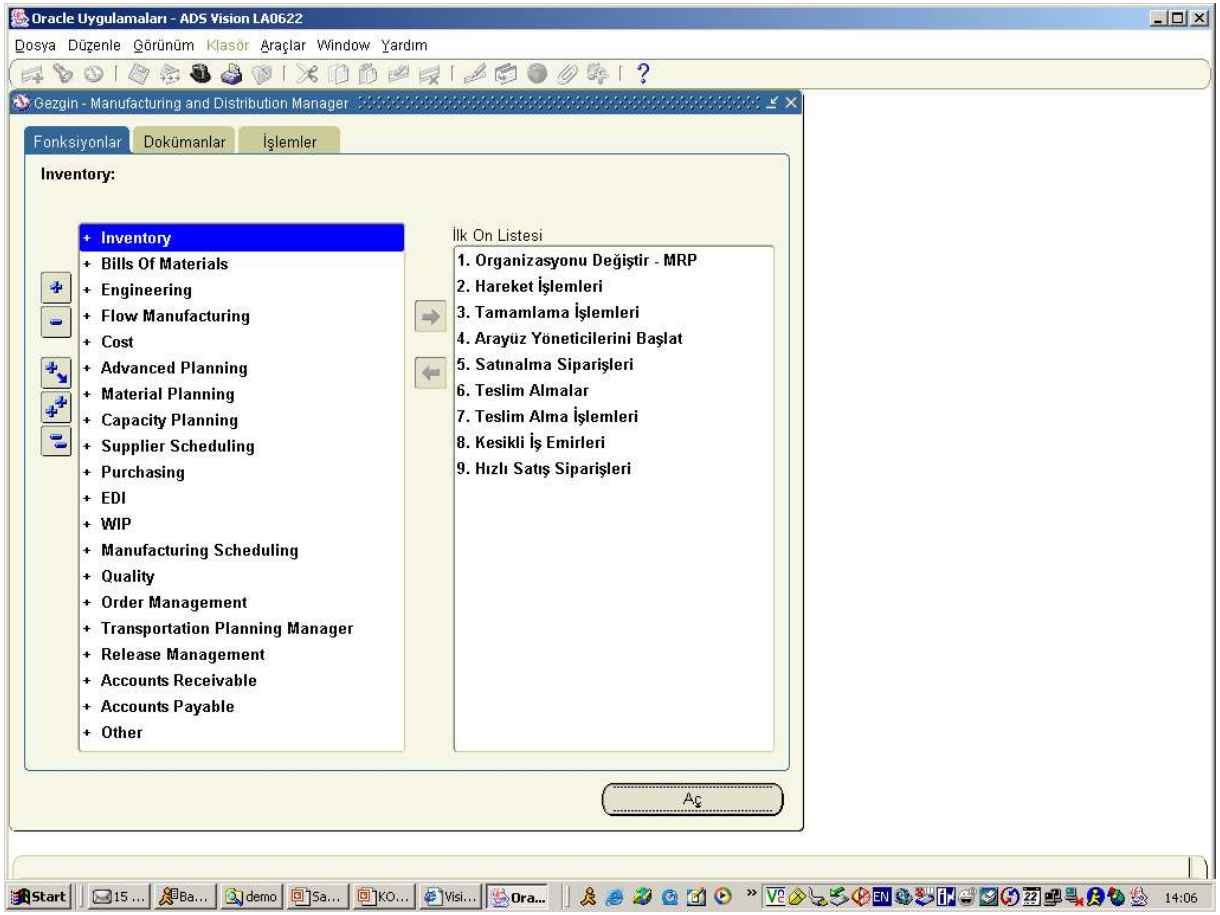
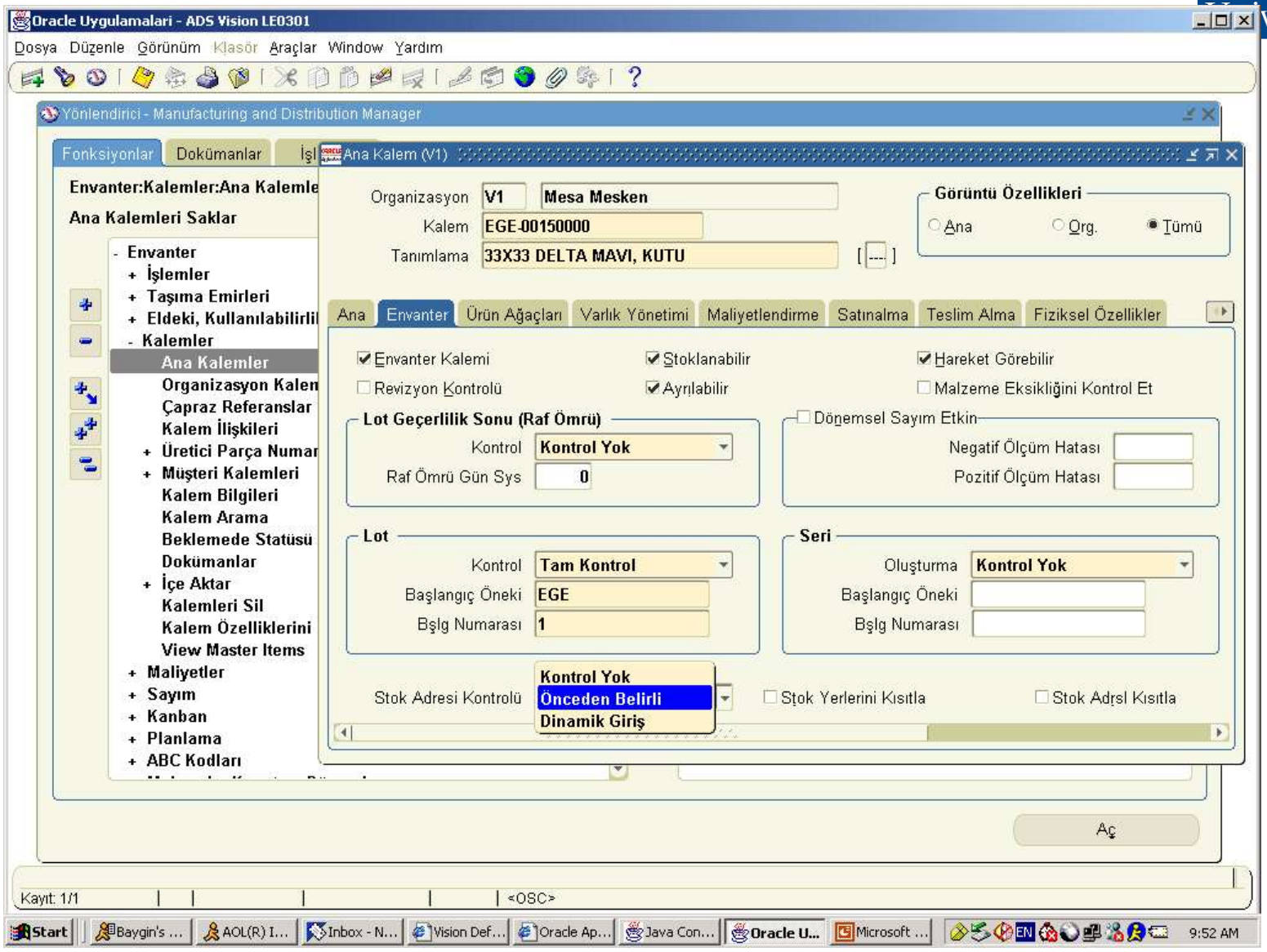
Components of the Database Environment



ERP Screen Shots




Oracle Uygulamaları - ADS Vision LE0301
Dosya Düzenle Görünüm Klasör Araçlar Window Yardım
Yönlendirici - Manufacturing and Distribution Manager
Fonksiyonlar Dokümanlar İşl
Ana Kalem (V1)
Envanter:Kalemler:Ana Kalemle
Ana Kalemleri Saklar
- Envanter
+ İşlemler
+ Taşıma Emirleri
+ Eldeki, Kullanılabilirli
- Kalemler
Ana Kalemler
Organizasyon Kalen
Çapraz Referanslar
Kalem İlişkileri
+ Üretici Parça Numar
+ Müşteri Kalemleri
Kalem Bilgileri
Kalem Arama
Beklemede Statüsü
Dokümanlar
+ İçe Aktar
Kalemleri Sil
Kalem Özelliklerini
View Master Items
+ Maliyetler
+ Sayım
+ Kanban
+ Planlama
+ ABC Kodları
Organizasyon V1 Mesa Mesken
Kalem EGE-00150000
Tanımlama 33X33 DELTA MAVI, KUTU
Görüntü Özellikleri
Ana Org. Tümü
Ana Envanter Ürün Ağaçları Varlık Yönetimi Maliyetlendirme Satınalma Teslim Alma Fiziksel Özellikler
Envanter Kalemi
Stoklanabilir
Hareket Görebilir
Revizyon Kontrolü
Ayrılabilir
Malzeme Eksikliğini Kontrol Et
Lot Geçerlilik Sonu (Raf Ömrü)
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Raf Ömrü Gün Sys 0
Dönemsel Sayım Etkin
Negatif Ölçüm Hatası
Pozitif Ölçüm Hatası
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Kontrol Tam Kontrol
Başlangıç Öneki EGE
Bşlg Numarası 1
Seri
Oluşturma Kontrol Yok
Başlangıç Öneki
Bşlg Numarası
Stok Adresi Kontrolü
Kontrol Yok
Önceden Belirli
Dinamik Giriş
Stok Yerlerini Kısıtla
Stok Adrsl Kısıtla
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Java Con...
Oracle U...
Microsoft ...
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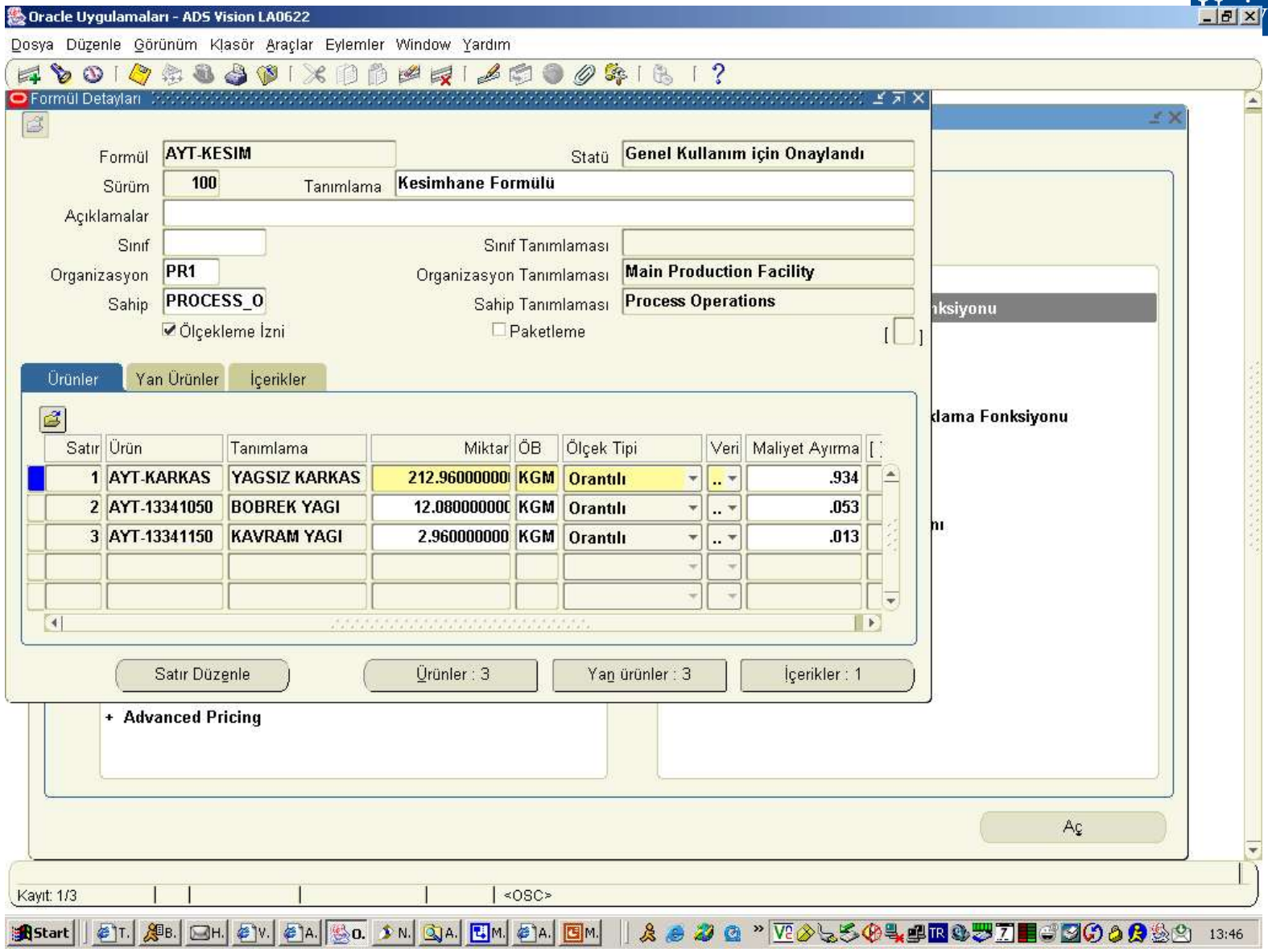
Oracle Uygulamaları - ADS Vision LA0622
Dosya Düzenle Görünüm Klasör Araçlar Eylemler Window Yardım
Formül Detayları
Formül AYT-KESIM
Statü Genel Kullanım için Onaylandı
Sürüm 100
Tanımlama Kesimhane Formülü
Açıklamalar
Sınıf
Sınıf Tanımlaması
Organizasyon PR1
Organizasyon Tanımlaması Main Production Facility
Sahip PROCESS_O
Sahip Tanımlaması Process Operations
Ölçekleme İzni
Paketleme
Ürünler
Yan Ürünler
İçerikler
Satır Ürün Tanımlama Miktar ÖB Ölçek Tipi Veri Maliyet Ayırma
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2 AYT-13341050 BOBREK YAGI 12.080000000 KGM Orantılı .053
3 AYT-13341150 KAVRAM YAGI 2.960000000 KGM Orantılı .013
Satır Düzenle
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Yan ürünler : 3
İçerikler : 1
+ Advanced Pricing
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